

## CLAIMS

What is claimed is

- 1           1.     A filter unit for the purification of air, the filter unit comprising:  
2                 a first filter element comprising granular activated carbon as an adsorbent  
3     material, and  
4                 a second filter element comprising a combination of granular activated  
5     carbon and activated carbon fibers as an adsorbent material.
- 1           2.     A filter unit as in claim 1 wherein the granular activated carbon is  
2     spherical activated carbon.
- 1           3.     A filter unit as in claim 1 wherein the second filter element is  
4     arranged downstream of the first filter element.
- 1           4.     A filter unit as in claim 1 wherein the mean particle diameter of the  
2     granular activated carbon of the first filter element is greater than the mean particle  
3     diameter of the granular activated carbon of the second filter element.
- 1           5.     A filter unit as in claim 4 wherein the mean particle diameter of the  
2     granular activated carbon of the first filter element is at least 0.05 mm greater than the  
3     mean particle diameter of the granular activated carbon of the second filter element.
- 1           6.     A filter unit as in claim 4 wherein the mean particle diameter of the  
2     granular activated carbon of the first filter element is at least 0.2 mm greater than the  
3     mean particle diameter of the granular activated carbon of the second filter element.

1                   7.     A filter unit as in claim 1 wherein further comprising an additional  
2 filter element arranged between the first filter element and the second filter element, the  
3 additional filter element containing granular activated carbon as the adsorbent material.

1                   8.     A filter unit as in claim 1 wherein further comprising at least one  
2 separating filter element for separating solid particles preceding the first and second  
3 filter elements.

1                   9.     A filter unit as in claim 8 wherein the separating filter element is a  
2 textile material.

1                   10.    A filter unit as in claim 8 wherein the separating filter element  
2 effects purely mechanical separation of solid particles.

1                   11.    A filter unit as in claim 7 wherein the granular activated carbon of at  
2 least one of the first filter element and the additional filter element is present in the form  
3 of loose fill.

1                   12.    A filter unit as in claim 7 wherein the granular activated carbon of at  
2 least one of the first filter element and the additional filter element is fixed in a three-  
3 dimensional, air-permeable support structure.

1                   13.    A filter unit as in claim 12 wherein the three-dimensional support  
2 structure is an open-cell foamed plastic.

1                   14. A filter unit as in claim 13 wherein the mean cell diameter of the  
2 open-cell foamed plastic is at least twice as great as the mean particle diameter of the  
3 granular activated carbon of the at least one of the first filter element and the additional  
4 filter element.

1                   15. A filter unit as in claim 7 wherein the mean particle diameter of the  
2 granular activated carbon of the first filter element is greater than the mean particle  
3 diameter of the granular activated carbon of the additional filter element.

1                   16. A filter unit as in claim 7 wherein the mean particle diameter of the  
2 granular activated carbon of the first filter element is at least 0.05 mm greater than the  
3 mean particle diameter of the granular activated carbon of the additional filter element.

1                   17. A filter unit as in claim 7 wherein the mean particle diameter of the  
2 granular activated carbon of the first filter element is at least 0.2 mm greater than the  
3 mean particle diameter of the granular activated carbon of the additional filter element.

1                   18. A filter unit as in claim 1 wherein the granular activated carbon is  
2 produced by carbonization and subsequent activation of suitable organic starting  
3 materials in granular form.

1                   19. A filter unit in as in claim 1 wherein the activated carbon fibers are  
2 produced by carbonization and subsequent activation of suitable organic starting fibers.

1                   20. A filter unit as in claim 19 wherein the starting fibers are selected

2 from among the groups of cellulose fibers, fibers based on cellulose derivatives, phenol  
3 resin fibers, polyvinyl alcohol fibers, pitch fibers, acrylic resin fibers, polyacrylonitrile  
4 fibers, aromatic polyamide fibers, formaldehyde resin fibers, divinylbenzene-crosslinked  
5 polystyrene fibers, lignin fibers, cotton fibers and/or hemp fibers.

1 21. A filter unit as in claim 1 wherein the activated carbon fibers are  
2 present in the form of an activated carbon fiber textile material.

1 22. A filter unit as in claim 1 wherein the activated carbon fibers have  
2 mean fiber diameters of 1-25  $\mu\text{m}$ .

1 23. A filter unit as in claim 1 wherein the activated carbon fibers have a  
2 length-specific weight (titer) of 1-10 dtex.

1 24. A filter unit as in claim 1 wherein the mean particle diameter of the  
2 granular activated carbon in the second filter element is at least three times greater than  
3 the mean fiber diameter of the activated carbon fibers.

1 25. A filter unit as in claim 1 wherein the granular activated carbon and  
2 the activated carbon fibers in the second filter element are arranged in layers that are  
3 separate but that border on each other and/or are permanently joined to each other.

1 26. A filter unit as in claim 1 wherein at least one of the granular  
2 activated carbon and the activated carbon fibers in the second filter element are fixed  
3 on an air-permeable support.

1                   27. A filter unit as in claim 1 wherein at least one of the granular  
2 activated carbon and the activated carbon fibers have a specific surface (BET) of at  
3 least 800 m<sup>2</sup>/g and up to 1,500 m<sup>2</sup>/g.

1                   28. A filter unit as in claim 1 wherein at least one of the granular  
2 activated carbon and the activated carbon fibers are impregnated with an impregnation.

1                   29. A filter unit as in claim 28 the impregnation is based on at least one  
2 of metals and metal compounds selected from the group comprising copper, cadmium,  
3 silver, platinum, palladium, zinc, and mercury, and their compounds.

1                   30. A filter unit as in claim 28 wherein the impregnation is one of an  
2 acid and a basic impregnation.

1                   31. A filter unit in as in claim 28 wherein said impregnation comprises  
2 an impregnating agent which is 0.01 to 15 wt.% of the amount of impregnated activated  
3 carbon material,

1                   32. A filter unit for the purification of air, the filter unit comprising:  
2 a first filter element comprising granular activated carbon as an adsorbent  
3 material,

4 an additional filter element comprising granular activated carbon as an  
5 adsorbent material, and

6 a second filter element comprising granular activated carbon and activated

7 carbon fibers as an adsorbent material.

1                   33. A filter unit as in claim 32 wherein the filter elements are arranged  
2 one after the other in a downstream as follows: the first filter element, the additional filter  
3 element, and the second filter element.

1                   34. A method of purifying air, comprising:  
2                   providing a filter unit a first filter element comprising granular activated  
3 carbon as an adsorbent material, a second filter element comprising a combination  
4 granular activated carbon and activated carbon fibers as an adsorbent material, and an  
5 additional filter element comprising granular activated carbon as an adsorbent material  
6 arranged between the first filter element and the second filter element; and  
7                   flowing air to be purified through the filter unit.